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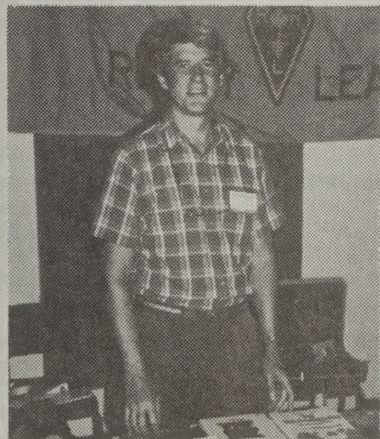
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ABOUT THE COVER



Carl Anderson, VE1UU, serves as CRRL Atlantic Region Director and Maritimes-Newfoundland Section Manager. Here's Carl behind the CRRL table at the last Atlantic Hamfest, held in Fredericton, New Brunswick. ■

It Seems to Us.../Il nous semble...

BBS Blues

Packet radio: I have enjoyed this mode for several years now, and I have tried several different programs to keep pace with the changes that have taken place. I have even considered changing my system to full BBS, but the more I think about it, the more skeptical I become.

Have you tried to have a *pleasant* packet QSO in the last year or so? I'm sure you have, but I'm also sure you have been frustrated by autoforwarding stations passing bulletins or whatever to all BBS stations in the LAN, or by stations connecting to a full BBS and typing "L" to get a list of that station's messages. To prevent this "listing problem", a number of BBS stations have configured their systems to accept "BBS connects only". This is fine since it does prevent tying up systems for long periods of time. But how does it help someone who wants to put NTS traffic into a system when he or she gets back a message saying "Sorry—BBS connects only"?

As I mentioned, I can't blame any station for resorting to this configuration, but is this the answer? In my opinion, we have far too many stations set up for full BBS. These stations are constantly sending information to one another, information of little interest to anyone else. For instance, I've occasionally noticed stations asking a BBS for a list of traffic, and in some cases even asking to read a "for sale" item, but most times they ask just to see what's in the BBS. This may take 30–40 minutes to transmit, and for what? To see print on a screen?

I sincerely compliment those with BBS stations for leaving their stations on the air 24 hours a day for our use, but do we need twenty stations to do the work of perhaps six good stations? I guess I'm particularly concerned that by the time all the information is passed back and forth between full BBS stations, NTS traffic takes a low priority. This is embarrassing to say the least. Packet radio should be and can be fast, but most NTS traffic still flows faster on the old phone and CW nets than on packet.

On 20 metres, there was a time when you could hear BBS stations only on 14.107–14.111 MHz. Now you can scan the 20-metre band and hear BBS stations using 14.098–14.113 MHz and up. The craziest part is that often they are all sending the same information, an elite group of stations using closed BBSs on three different frequencies. Then we have individuals coming onto these frequencies using 1200-baud packet, trying to get their messages through or to have an old-

fashioned QSO. I must admit that it is very tempting to change ports and work 1200-baud packet on the 20-metre band. Maybe this would lessen some of the congestion on the VHF packet channels.

Recently, ARRL suggested a band plan which would have packet move down to below 14.100 MHz. (Editor's note: this has been part of the IARU Region 2 recommended band plan for many years.) I believe this is where we should have been operating packet in the first place. But with a large number of full BBS stations trying to operate below 14.100 MHz, it wouldn't have been long before we would have heard from the RTTY, AMTOR and CW stations established there for many years. And with full BBS stations trying to have their own frequencies, the band would have been full from 14.100–14.080 MHz down, with BBS stations passing—or trying to pass—a lot of duplicate information.

Packet radio is great: KA-nodes, digis pbbs's, etc. But how do you use these features when BBS stations are tying up the frequencies where we were once able to have real communications and a bit of fun? I'm sure many will not agree with me, but this is my opinion. Happy packeteering! —*Jack Adams, VE4JA, Manitoba Section Manager*

TECHNICAL ARTICLES

We receive many comments about *QST Canada*. Most readers say they enjoy it and carry on the good work. This is always encouraging because except for the actual printing, *QST Canada* is entirely produced by volunteers. Of course, many readers have suggestions for improvement. Most often heard: publish more technical articles.

QST Canada was first conceived as a supplement to *QST*, and the plan was to let *QST* handle the technical end of things. Now that *QST Canada* is on its own, we agree with those who want the technical articles. In fact, we would like to publish one a month. But we can't publish what we don't have. That is where you come in.

Do you have a special technique or a project that would be of interest? Could we have a writeup for *QST Canada*? We should warn you that we do not pay for articles. So far, this has not been a problem for our authors. Their interest has been in sharing their knowledge, and they understand that no one—not even the editor—is paid for his or her work!

Flood us with articles! Thanks and 73.
—*Harry MacLean, VE3GRO, Editor* ■

All letters are considered carefully. Letters are edited and may be condensed in order to have more information and readers' views presented. The publishers of *QST Canada* assume no responsibility for statements made by correspondents.

BOUVET AGAIN

As we stated last month, many amateurs contacted us about the recent Bouvet Island DXpedition. The following letter was typical.

In reference to the NW2I letter in February *QST Canada* regarding the disgusting operations on 14.145 MHz during the Bouvet Island DXpedition, I, along with probably several hundred other amateurs heard the jamming, foul language and generally ignorant transmissions. I felt ashamed that grown men could act in this manner just because some of them could not make their little contact with a rare prefix.

I do take exception to NW2I's suggestion that the operators involved were Canadian. Most of the operators had a distinct American accent and, of course, were in violation of FCC rules by operating phone below 14.150 MHz. WIAW reported that FCC issued 240 notices of violation for phone operation out of band. —*Jerry Dixon, VE5DC, Sinaluta, SK*

CONFIRMING CANADIAN PREFIXES

I have to agree with the comments of Peter Khfus, DEØDXM, who mentioned problems getting QSL cards from Canada. I have worked 135 Canadian prefixes and it has been a monumental task getting some of them confirmed. I am still wait-

ing for several cards: VX2AVU, XM1XG, VO4GW, CF6CF and CF6SYN, and a few VY2s worked since they got their new prefix. How about it, fellows!

Having operated from Scotland for a few years, I can say that a 20% QSL rate from this country is about par. If amateurs are going to operate with special prefixes, they should have cards to confirm their QSOs. It is hard for DX stations to get Canadian awards if we don't QSL.

A few years ago, I contacted a VE who was using a special prefix. He wasn't planning to QSL. He didn't believe in it. But he was looking forward to all the stamps and IRCs coming in! —*Bill Hardie, VE3EFX, Kincardine, ON.*

The Canadian Radio Relay League, Inc La Ligue Canadienne de la Radio Amateur, Inc



The Canadian Radio Relay League (CRRL) is a noncommercial association of radio amateurs organized for the promotion of Amateur Radio communications and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and the public welfare, for the representation of radio amateurs in legislative and other matters, and for the maintenance of fraternalism and a high standard of conduct.

CRRL is incorporated under the Canada Corporations Act. Its affairs are governed by a seven-member Board of Directors elected every two years by the CRRL general membership. CRRL is noncommercial, and no one who could gain financially by the shaping of its affairs is eligible for membership on its Board.

CRRL is the Canadian member-society of the International Amateur Radio Union (IARU). "Of, by and for the Canadian Radio Amateur", CRRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement in amateur affairs.

A bona fide interest in Amateur Radio is the only essential requirement for membership. An Amateur Radio licence is not required, although full voting membership is granted only to licensed amateurs in Canada.

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Calendar



Attention: Deadline for items is the 1st of the second month preceding the month of publication. For example, information would have to reach *QST Canada* by January 1 to be included in a March issue.

Ajax, ON: Durham Region Amateur Radio and Computer Fleamarket, Saturday, April 7, at Pickering High School, Church St, Pickering Village, Ajax. Sponsored by South Pickering ARC and North Shore ARC. Opens 9 a.m., vendor setup at 7:30 a.m. Admission \$4. Tables \$10 plus admission. Contact Ron Brown, VE3WZ, Box 53, Pickering, ON L1V 2R2, Tel (416) 675-7314.

CRRL April "QST" QSO Parties: See notice in this month's *QST Canada*.

Orillia, ON: Annual Olde Tyme Radio Operators' Reunion, Thursday, June 21, at Couchiching Park. Look for VE3 licence plates and meet near Champlain's Monument at 2:30 p.m. Cash bar at 4 p.m., dinner 5-7 p.m., Saturn Room, Sundial Inn, five minutes from the park. A few surprises, but no speeches. Dinner tickets \$16. Order by June 1 from Bob "Ding" Dunn, VE3ATK, 318 Short Ave, Woodstock, ON N4S 4B1, Tel (519) 537-7343. Other information from Roy Bennet, VE3VS, Willowdale, ON, Tel (416) 493-5526.

Ottawa, ON: Spring Fleamarket, Sunday, April 21, at Canterbury High School, east end of Ottawa. Sponsored by Ottawa Valley Mobile Radio Club. Opens 9 a.m., vendor setup 8 a.m. Admission free. Contact Jerry Wells, VE3CDS, 12 Sutton Pl, Nepean, ON K2E 5G2.

Sorel-Tracy, PQ: Quebec Provincial Hamfest, Saturday, May 27, at the Tracy Curling Club. Sponsored by Sorel-Tracy ARC. Opens 9 a.m., vendor setup 7 a.m. Admission \$5. Outdoor tables \$8, indoor tables \$10 (quantities limited, reserve before May 15). Contact Sorel-Tracy ARC, Box 533, Sorel, PQ J3P 5N6.

Sorel-Tracy, PQ: Le Hamfest Provincial du Québec, le dimanche 27 mai, au Club de Curling Tracy, à 0900 (0700 pour les exposants). Admission 5\$. Table extérieure 8\$, intérieure 10\$ (quantité limitée, prière de réserver avant le 15 mai.) Écrire à CRA Sorel-Tracy, CP 533, Sorel, PQ J3P 5N6.

Winnipeg, MB: Spring Fleamarket, Sunday, April 29, at Waverly Heights Community Centre, 1885 Chancellor Dr. Sponsored by Winnipeg ARC (WARC). Opens 9 a.m., vendor setup 8-9 a.m. Admission free to WARC members, \$1 for all other. Tables \$5. Refreshments available. Contact Blake Dunn, VE4AAF, 67 Loyola Bay, Winnipeg, MB R3T 3J7, Tel (203) 269-7999.

New Techniques in EME

Fewer wavelengths to the moon make 160 the band of choice.

By William Skidmore, VE3AUI
The Anchorage, R R 1
Hyde Park, ON N0M 1Z0

Moonbounce (earth-moon-earth or EME) was pioneered by amateurs in the 1950s and became normal operation for well-equipped VHF-UHF stations in the 1970s and 80s. The better stations have worked many countries and most US states on EME, operating in the 144-, 220-, 432- and 1296-MHz bands. The trend has been to move upwards in frequency, and now, much EME work is done in the 432- and 1296-MHz bands. There are several reasons for this: ease of obtaining antenna gain at higher frequencies and the ability of amateurs to generate sufficient power at those frequencies to give EME a serious try. But there are other factors affecting EME operation: path loss over the EME route, the varying efficiency of the moon's surface as a reflector, and earthly technical matters such as feedline loss, accurate aiming of antennas and so on.

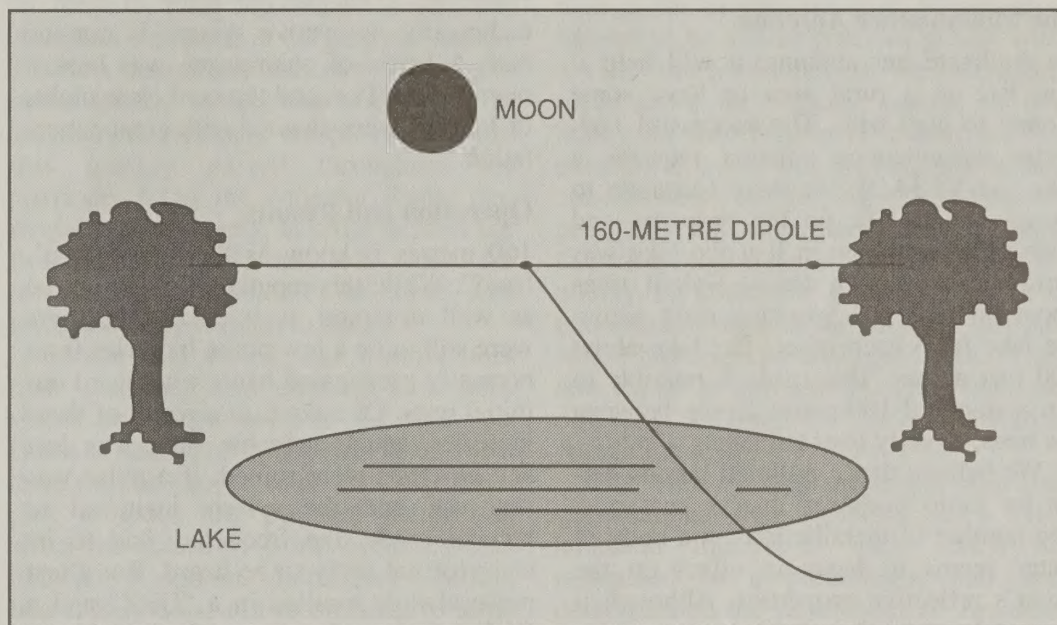
In fact, so many problems have absorbed the thoughts of moonbouncers, that an obvious technique of great promise has been overlooked. This paper is a report on this new technique, on which VE3AUI has worked nearly full time for the last two years.

Theoretical Background

Taking 144 MHz as an example, we know from long amateur practice that with full legal output to an antenna having about 20 dB gain, it is just nicely possible to overcome the path loss from earth to moon and back, assuming of course, the very best receiving systems with a noise floor of around one-half dB. Our best techniques on 144 MHz make it possible to hear one's echoes, or those of other amateur stations, returning from the moon some three to five dB above the noise.

Taking the step to higher amateur bands produces somewhat better results, but with great cost and considerable added difficulty. Of course, the move to higher frequencies has been motivated by the well-known fact that shorter wavelength RF energy is capable of producing greater results for a given amount of power. This fact is applied in microwave ovens where 700 watts of power can cook a Christmas turkey in fifteen minutes, but 700 watts of 80-metre energy won't warm a potato even if you leave it in all day.

But this kind of analysis leaves out the



The moon's tidal force on the lake results in a self-tracking antenna system for 160-metre EME.

important matter of wavelength, which has been forgotten in the headlong rush to higher frequencies for EME work.

If you have ever tuned up a beam with a field strength meter, you know that it is necessary to remove the meter about ten wavelengths or so from the antenna under test to get reliable results. This works out to about 20 metres of separation for the two-metre band. But if you were tuning up a 160-metre 8JK beam, for example, some of the brethren in our smaller centres might have to get right out of town to achieve ten wavelength's separation. Ten wavelengths on our 160-metre amateur band is almost a mile long!

The fact that ten wavelengths is almost a mile on 160, and only about the distance from the pitcher's mound to home plate on two metres, holds out the theoretical breakthrough on which this article is based. For it becomes obvious that while a two-metre wave concentrates energy in a superior way, it takes something like 80 times as many waves to reach the moon as would be required on the 160-metre band. This further suggests, that from path-loss analysis, a reasonable attempt at moonbounce could be developed on the 160-metre band with something less than one-eightieth the effective radiated power required on two metres. In fact, it is theoretically possible to send a signal to the moon and back on the 160-metre band,

with a normal 100-watt transceiver, if a four-dB antenna gain is used.

Of course, a complicating factor in all of this is the ambient noise found on the 160-metre band, high when compared to the noise on the two-metre band. This higher noise level must be surmounted by greater effective radiated power than pure theory suggests. It works out that 500 watts output into the four-dB antenna will do the job nicely, at least on quiet nights. Clearly, this is a possibility that EME enthusiasts have overlooked. Almost any amateur can produce 500 watts output on the 160-metre band. All that is needed, then, is the four-dB gain antenna system that can be aimed at the moon.

Experimental EME Equipment at VE3AUI

The equipment in the shack is not remarkable: a pair of Drake twins, an R4-C and a T4X-C. It is necessary to use a separate transmitter and receiver, or a receiver with incremental tuning, because it is usually necessary to shift the receive frequency a hundred hertz or more from the transmitted frequency because of Doppler shift. The power amplifier is homemade: a pair of 304TLs in grounded grid running a kilowatt input. The feedline is conventional: a pair of #14 wires, soft drawn, spaced six inches apart. Feeder spreaders are made of wood and boiled in paraffin

wax for waterproofing.

The antenna system was a little bit of problem. It is not only necessary to develop an honest four-dB of gain; that gain must be directed at the moon. First, a fixed system was tried. The antenna was aimed at a "window" into which the moon moved for a few minutes two or three nights a year. The system worked, but because the moon was in the window for such a short period of time, it made using this system frustrating. An alternative was sought.

The Moonbounce Antenna

To duplicate our antenna, it will help if you live in a rural area or have some money to play with. The successful 160-metre moonbounce antenna requires a lake. At VE3AUI, we were fortunate to have a small lake on the property, and even more fortunate in that the lake was surrounded by high trees—walnut trees about 90 feet high growing right across the lake from each other. The lake about 300 feet across. This made it possible to run a standard 160-metre dipole between the trees, directly over the lake.

We believe that a polluted lake is better for radio purposes than a pure one. The number of metallic ions in a body of water seems to have an effect on the water's reflective properties. Although it has not been tried, it is likely that a lake full of empty beer cans would be extremely effective. Whatever, the point is that water under an antenna is an excellent reflector, capable of producing gain of the order of four to five dB in an upwards direction.

This left the problem of antenna steering, and for several months this problem seemed insurmountable. It was only when an Amateur Radio friend, VE3ONK, who is also a sailor, left some documents behind after one of his visits to our shack, that a solution was stumbled upon—quite by accident. VE3ONK was in the midst of planning a sailing cruise and had obtained a book of tide tables. In this book were listed the times and amounts of tidal movements for several bodies of water, and it occurred to us that the tide running in our lake, albeit small, might hold the key. Considerable analysis, assisted by a C-64 correlation program normally used in medical research, showed that the tides in a given body of water are not only dependent on geographical position and the amount of water, but also upon the depth of the water. Further, it appeared that as tides came in, the pitch of our lake, relative to the geographic horizontal, would actually skew the reflected wave towards the approaching moon. A similar tide would skew the pattern towards the receding moon. Thus, by orienting our dipole north and south directly over the centre of our lake, an east-west sweep of directivity could be achieved. Not only

achieved, but controlled by the moon itself. No elaborate tracking or steering mechanism was necessary.

The only problem with this system was that, according to our calculations, our lake would have to be some 90 feet deep to achieve proper tide flow. At \$50 an hour it cost considerable money, but a backhoe was called in dig out the lake to a level of 90 feet. It turned out that our calculations were inaccurate and an additional ten feet had to be taken out before the antenna successfully tracked the moon. However, a ten-percent error in such a technically innovative system is not too bad. A bottle of champagne was broken over the 304TLs, and the cool clear nights of January were awaited with great expectation.

Operation and Results

160 metres is known as the "gentleman's band". While this reputation might not be as well deserved as it once was, there were still quite a few polite inquiries from normally propagated hams who heard our initial tests. Of course, as a result of these inquiries, much valuable time was lost and our tests were ruined. If a pulse was sent out and the system switched to receive mode, the frequency had to be clear for the reply to be heard. But a test pulse always resulted in a "QRZ" and a QSO of several minutes in which the setup and the purpose of our transmissions had to be explained. Understandably, when we first went on the air and the project was new, considerable attention was drawn to our activities, and many nights were more or less wasted.

It was discovered that twilight and early morning, around dawn, were the best times for 160-metre moonbounce, so long as the moon was up at these times, which was not always the case. These were the times when local signals would fade, and when long-haul DX was propagated specific areas, and potential QRM was at its lowest.

The frequency selected for this kind of work must not fall on the harmonic of an AM broadcast station. Since we were looking for echoes only three or four dB above the noise, any kind of QRM in the background was a real problem. It was discovered that the upper part of the 160-metre band was better because BC harmonics were fewer, and other amateurs tended to use the lower part of the band. Unfortunately, the frequency shift of nearly 200 kHz meant that the antenna had to be taken down and trimmed. Worse yet, the lake had to be filled by nine inches to reorient the tidal reflection to the new frequency. This was done with a shovel, the backhoe being too expensive to use again. Thus, the winter of our first year was lost with every available minute being spent with the antenna, adjusting the pattern.

Something like a year and a half had

passed since the inception of the project. The second summer, with high noise levels on 160, was spent on other activities such as fishing. (The lake had been stocked with fish the previous spring.) But the second winter brought the results that made all the theoretical analysis and subsequent work worthwhile.

A trip to the moon and back is something like one-half million miles. The time delay for signals travelling at the speed of light is about three seconds. Thus, a system of echo detection was worked out. A pulse of one second was sent, followed by approximately half a second during which the antenna changeover relay clicked and the R4-C swung into action. This left a second and a half for the echo to appear. The duration of the echo was approximately one second, and therefore the next transmission was timed to start no sooner than four seconds after the previous one. It was discovered that a slight modification to the Hallicrafters TO keyer normally used in the shack would slow down the rate of sending dashes to the point where the rhythm just described could be effected with ease.

A mechanical detection system using an old FAX machine was attached to the output of the R4-C. The transmitted pulse was detected by a neon bulb which started the FAX. The FAX ran at a known rate. Thus, three seconds later, if an echo was detected, a mark on the FAX paper would indicate the incoming signal. This system was used with good success until seeing returning echoes became downright boring, and this activity had to be dropped in favour of real QSOs. During this time, the antenna system was fine tuned, and an inch of lake bottom was dug out again. The returning echoes peaked to six dB above the noise, a remarkable achievement.

QSOs on 160-Metre Moonbounce

I wish it were possible to report a large number of successful 160-metre EME QSOs. But the system is in its infancy, and several problems still exist. During the second winter, all stations heard on 160 metres during our hours and hours of listening were sent a long and detailed letter describing our experiments and inviting participation. The letter pointed out that changes to a station's location and antenna systems would be required for to achieve moonbounce status on 160 metres. Perhaps understandably, only a minority of amateurs contacted responded favourably. Some who did respond had to be weeded out as thrill seekers or otherwise unsuitable for the project. Many lived on city lots where a 100-foot deep lake 300 feet across was not allowed under zoning regulations or restrictive covenants. This matter is being taken up with appropriate governments agencies by

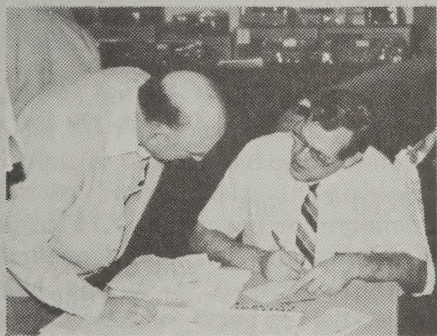
the CRRL. Sometimes small technical problems stood in the way.

Out of 6000 stations contacted by letter, only two amateurs had the time, money, real estate and access to excavating equipment. One of these was in Norway where power restrictions on 160 metres precluded any further development of the project on his part. The other amateur, who might have shown great promise in this project was VE3ONK who had left the tide tables behind. Unfortunately, VE3ONK lives only a mile from VE3AUI. As yet, no system of eliminating the considerable ground-wave signals between our two stations has been devised. Undoubtedly, moonbounce signals are being received, but the lag time for the receivers to come to life after receiving a one kilowatt pulse at a range of one mile is just too long.

Conclusions

As this paper shows, considerable ground work has been done to achieve moonbounce communications on the 160-metre band. Anyone who was missed in the original poll of 160-metre stations, and who thinks he or she might qualify as the other end of the world's first 160-metre moonbounce QSO, should contact the writer at the address given above. ■

SIGN UP A NEW MEMBER



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JY1 Visits Calgary

By David Krull, VE6NA

Our involvement started on Saturday, September 23, at the quarterly Alberta Amateur Radio League (ARLA) meeting in Red Deer. Our president, Norm Waltho, VE6VW, advised us that we had an opportunity to host a reception for JY1, His Majesty King Hussein of Jordan! The reception was to be in Calgary on October 16—less than one month away. We had to move quickly to organize a guest list of amateurs to represent our province. Word was quickly passed throughout the province, using the Amateur Radio networks. Unfortunately, in order to meet our deadlines, we could only take names for two days. Our apologies to those who were not lucky enough to attend.

Jordan is a varied land that includes high plateaus, arid deserts, and steep slopes that reach down to the Red Sea. Hussein rules over a population of about three million people, in an area with complex religious and political issues that affect the course of world events. Words like Arab Kingdom, Middle East Conflict, Islam, Bedouins, and so on bring to mind concepts that are foreign to most of us. What could possibly bond us with His Majesty? Our common interest in Amateur Radio!

Time passed quickly. Our meeting with King Hussein turned out to be on the same day as the Calgary municipal elections. Just before 1600 hours, about 50 of us gathered in the lower lobby of the Palliser Hotel and made our way up the elevator to the Penthouse Suite. On our way up we stopped at an intermediate floor that bristled with Jordanian security. At the penthouse we signed in and received a gold name pin. It seemed that there were about 50 RCMP security officers in the room!

It was nice to have time to visit with friends from around the province and

enjoy the tasty snacks. A protocol officer briefed us on how to address the King: not "Mr Hussein" but, "Your Majesty". Shortly after, King Hussein appeared and joined us.

After a short address, JY1 mingled with us for an informal chat. He revealed himself to be a most gracious person with a wide variety of interests. We exchanged ideas about the various aspects of our hobby in our respective countries. An example in point was his response to our concern about the greying of our amateur population and our concern about keeping licensing requirements current with technology. He noted that Jordan did not have this concern because his Minister of Education had implemented courses on Amateur Radio in the schools. They have no difficulty keeping the Amateur Radio population up!

His Majesty was presented with the Canadian call sign, VE6/JY1, and a VHF handheld transceiver with which he responded to a prearranged call and demonstrated the capabilities of Amateur Radio to the news media. He handed out QSL cards to those who had QSOs with him during his visit. The QSL cards were especially memorable because of the signed photo of His Majesty at the console of his station. The royal colors and embossed insignia added a nice touch to each card. His hospitality was extended to those who could not be present by arranging a sked for later that night. He also chatted with a few local amateurs from his plane on his return to England—a fitting farewell to a visit to our country.

Our meeting with King Hussein demonstrated that Amateur Radio is an interest that covers a whole spectrum of population from young to old, and rich to poor. Amateur Radio is truly a fraternity that binds mankind. ■

CRRL "QST" Award Party

Sponsored by the Canadian Radio Relay League. Phone: 1400-2200, April 21 and 22, 14.13 and 21.25 MHz, other bands if conditions permit. CW at 1400-2200 UTC, April 28 and 29, low ends of the 20- and 15-metre bands. Twelve stations with "QST suffix" call signs will be on the air—your chance to get all the contacts you need for the CRRL *Worked QST Award* in one or two weekends. To receive the award, contact any eight stations, any mode, any band. Send a copy of your log and an SASE or IRCs to CRRL Awards Manager Garry Hammond, VE3XN, 5 McLaren Ave, Listowel, ON N4W 3K1.



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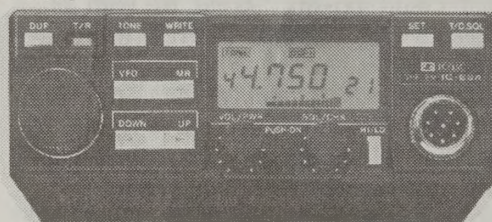
The DSP-10 consists of a digital unit, which performs digital signal processing; an analog unit, which processes analog signals and sends them to the digital unit, and converts the input from the digital unit back to analog signals; and a PLL unit, which generates clock pulses for managing the frequencies in the main unit and performing digital signal processing with an accurate sampling frequency.

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Notes from All Over

ACROSS CANADA

□ DOC has announced that, as part of the federal government's deregulatory initiatives, users of the General Radio Service (27-MHz Citizen's Band or CB) will no longer require a radio licence. This change will take effect on 1990 April 01.

□ Prefix hunters, take note: To commemorate the 25th anniversary of the Maple Leaf Flag, the Maple Leaf Radio Society of Listowel, Ontario, will be using the special callsign CF25A until April 15. To publicize Sault Ste-Marie, Ontario, as the Forestry Capital of Canada, amateurs in that city may use the special prefix CF3 from 1990 June 15 to 1990 June 24.

□ Look for VO1MD during International Marconi Day, 1990 April 21, operating from Cabot Tower, Signal Hill, St. John's, Newfoundland, site of reception of the first transatlantic radio message nearly ninety years ago.

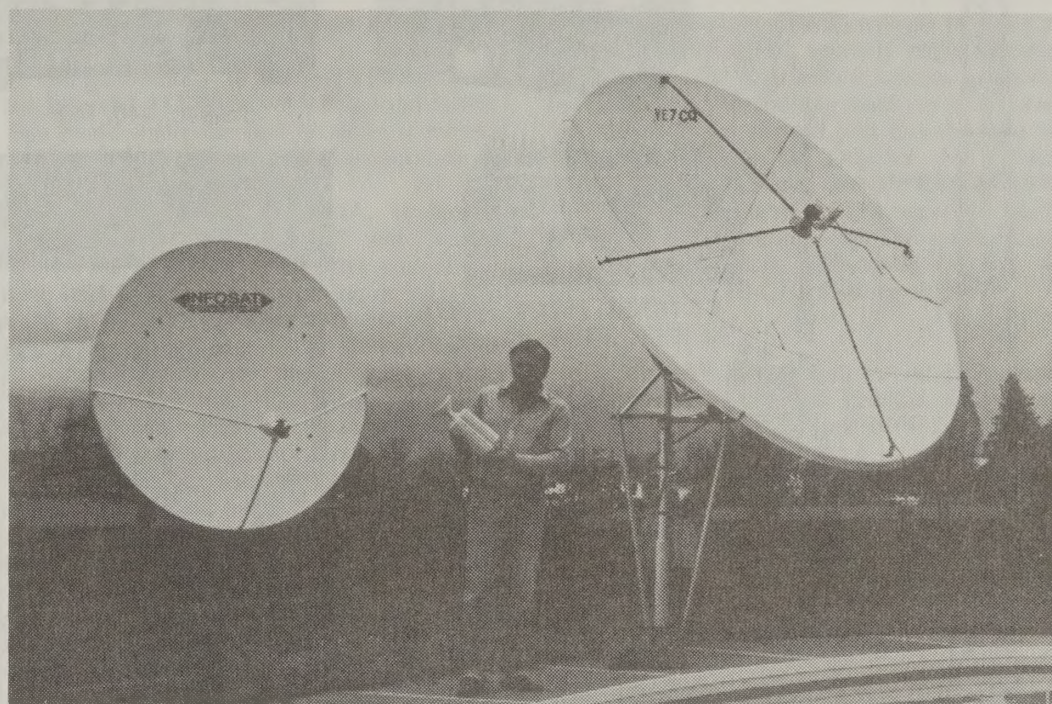
□ The 1990 CRRL Board of Directors Meeting will be held in Rexdale, Ontario, on the weekend of May 12-13. If you have matters for consideration by the CRRL Board, contact your nearest CRRL Regional Director soon.

SOUTH OF THE BORDER

□ AG2I, Newfane (Lockport), New York, has become the first US repeater to join the VE3ULR repeater network. The VE3ULR network, centred in Aurora, Ontario, just north of Toronto, now links repeaters in sixteen locations, from as far west as London, to as far east as Kingston and as far north as Midland, Ontario.

□ The US FCC has voted to expand the US 6-metre repeater subband from 52-54 MHz to 51-54 MHz. In making this change, FCC expressed the opinion that voluntary band plans for 50-51 MHz would provide adequate protection for weak-signal work being carried out there.

□ The US FCC is proposing to eliminate the present Novice and Technician licences and replace them with a new entry-level Communicator licence. According to an FCC news release, there would be two versions of the Communicator licence: a no-code version giving privileges on 220 MHz and above, and a code version giving privileges similar to the present Technician licence. Current Technician privileges include CW in the US Novice bands, and all-modes on 50 MHz and above. Holders of the Communicator licence would be limited to 200 watts PEP. FCC stated that the new licence would fulfill three major objectives: it would meet the needs of those who find CW a barrier to entering the US Amateur



IPARN, the Inter-Provincial Amateur Radio network, is working towards establishing a Canada-wide communications network using existing VHF-UHF networks and commercial satellite links. Here's the IPARN 1.8-metre satellite dish (left), and Bill Blake, VE7CQ, holding the outdoor unit (transmitter) at the Vancouver-area end of things. At press time, IPARN was in the process of getting a similar setup for a location outside of British Columbia so the network could begin operations. Interested in this project? Perhaps setting up a ground station in your area? For information, contact IPARN, Box 3156, Department 1189, Langley, BC V3A 4R5.

Service; it would be easy to implement into the current licensing structure; and it would avoid negative effects on present holders of the US Novice and Technician licenses, whose privileges would be grandfathered.

□ Once again, the Washington, DC-based Foundation for Amateur Radio (FAR) is offering thirty-three scholarships for licensed radio amateurs engaged in full-time studies beyond secondary school. Canadian amateurs are eligible for these scholarships which may be applied to tuition for Canadian universities and community colleges. For more information or an application form, write to FAR Scholarships, 6903 Rhode Island Avenue, College Park, Maryland 20740.

INTERNATIONAL NOTES

□ To promote use of the 10-, 18- and 24-MHz bands, Japan Amateur Radio League (JARL) has announced a new WARC '79 award. To qualify, contact a total of 79 Japanese stations—at least one in each of Japan's ten call areas—on the 10-, 18- and/or 24-MHz bands. Only contacts from 1989 July 01 to 1990 December 31 will count, and you must have QSL cards as proof of contact. However, the cards need not be sent to Japan. Possession of the cards may simply be verified by two licensed amateurs, or the awards manager

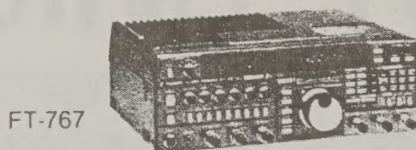
of the IARU-member Amateur Radio society in a particular country. In Canada, that would be CRRL Awards Manager Garry Hammond, VE3XN.

□ There's a new Japanese Amateur Radio satellite in orbit. JAS-1b, also known as Fuji 2 or FUJI OSCAR 20 (FO-20), was launched from the Tanagashima Space Centre on February 7. At press time, the satellite's signals were strong, and JARL, the Japanese Amateur Radio League, announced that if tests were successful, the satellite would be available for general use within two weeks. In the meantime, the satellite's CW telemetry could be monitored on 435.795 MHz, plus or minus 9 kHz for Doppler shift.

□ Did you know that Garry Hammond, VE3XN, is responsible for issuing the IARU Worked All Continents Award (WAC) in Canada? This award dates from the 1920s. If you don't have WAC, check your QSLs to see if you qualify. Then contact Garry for an application form.

□ Most Lithuanian radio amateurs are now using the LY prefix assigned before World War 2 instead of UP. The suffixes of Lithuanian callsigns appear to be unchanged. A new Lithuanian QSL bureau has also been established, operating separately from Box 88 Moscow. Address is Box 1000, Vilnius 232001, Lithuania, USSR.

YAESU



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FT-767GX, 757GX, 747GX

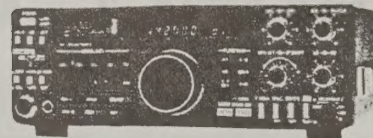


FT-23R, 33R, 73R

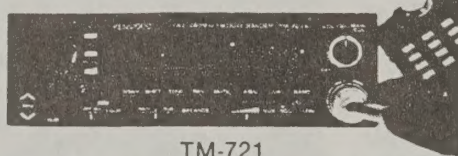
FT-727R
DUAL BAND HT



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TS-940, 440, 140



TM-721

TM-721A FM DUAL BANDER
TM-221A, 321A, 421A



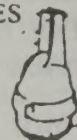
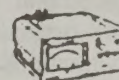
TH-215AT, 315A,
415A, TH-205AT

TH-25AT, 45AT



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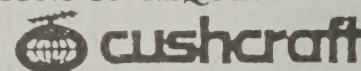
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Last Month Continued...

Last month, in our every-other-month VHF-UHF column, we had lots more to report, but we ran out of room! As promised, our editor found us some space in this month's QST Canada. Now we can finish up...

144 MHz: On the international front, Gus, HC5K, took a 2-metre moonbounce station to Galapagos Island in November. Using 2 Boomers, he managed to work Dave, W5UN, who happens to have the largest 2-metre array on earth!

Don't forget the Gas Light Net on 144.24 MHz USB every evening at 8 p.m. The NCS is VE3BGH in St. Catharines. Also, don't forget the 2-metre EME net Saturday and Sunday at 1700 UTC on 14.345 MHz. NCS is Lionel, VE7BQH. Listen in and get the word on the "worldwide 2-metre moonbounce program."

Kevin VE3KDH has big plans for the January contest. More later. A hearty welcome to Don, VE3SIM, of Otterville, Ontario, who is QRV on SSB with a Yaesu FT290 and 50 watts to a Cushcraft 215WB yagi.

VE1HD and VE1BVL will be listening on 144.140 MHz for transatlantic signals during periods of intense aurora. Both stations are running kW's and monster arrays.

432 MHz: With the decline in the tropo season, the Winnipeg gang is breathing easy because DOC has not received further interference reports from Uncle Sam. The only question I have is why the USAF is pointing their

radar up toward Winnipeg from an old ABM site.

Congratulations to Barry, VE4MA, who has received 432-MHz WAS #18 from ARRL. This world-shattering feat certainly is a credit to the technical expertise and dedication shown by this fine Canadian VHFer.

1296 MHz: Barry, VE4MA, is helping Kevin, VE4MR, get on 23 cm with a Microwave Modules Transverter and 45-element loop yagi. Kevin is working on a 20-watt solid state final. With his own station QRV, Barry says that his portable station will be passed on to VE4JA and then probably to Rick VE5RF in Yorkton. This will give Ross VE5LY someone local to talk to since he and Barry have not managed a contact yet between Winnipeg and Regina. Despite this, Ross is contemplating EME on 23 cm.

2300 MHz: Our 13-cm band may be under some pressure at WARC-92, judging by some documents I have in hand. CRRL will keep you up to date and do everything necessary to minimize problems on this AMATEUR secondary but very important band.

3456 MHz: Barry, VE4MA, continues to work on his station and now has 6.5 watts output from a 7289 cavity. More drive should bring up the power considerably. Remember, "no tune" transverters are available for this band and are easy to operate.

10 GHz: Barry, VE4MA, is working on two SSB transverters for 3 cm. That plus a

travelling wave tube (TWT) will get him to the moon. Bob, VE3BFM, recently played a tape of some 10-GHz SSB mobile communications he made prior to moving back to the Great White North. Let me tell you that the tape is surprising. Despite the Doppler shift while mobile, communications are possible on SSB even at 3 cm. Think of the DX we could work if we were all operating with SSB gear! Barry also mentioned that VE6SM in Calgary is working toward 10-GHz SSB capability.

REPEATER NEWS

Neil, VE3SST, active on 6- and 2-metre SSB/FM and president of TFMCS, has joined the crew at Sinclabs. I think we will be seeing some interesting VHF-related gear showing up soon! The TFM crew is continuing to work toward integration of the new 220-MHz repeater into their system, and is preparing to do major restoration work on the Uxbridge main tower, which is getting pretty rusty.

KEEP THOSE REPORTS COMING, CANADA!

Remember, your input keeps this column rolling right along, so keep those cards and letters coming. Thanks to all who have written. Let's have some news from VE7 and VE1. What are you folks up to? Thanks to Ross, VE5LY, for designing a wonderful activity reporting form. Send an SASE and I will forward a copy! 73 to all. ■

IARU

Conducted By Tom Atkins, VE3CDM
55 Havenbrook Blvd, Willowdale, ON M2J 1A7
Tel (416) 494-8721

What is That QRM?

Ever tuned around and found a strange signal that you can't copy, can't print, and always seems to be there? Maybe you are hearing non-amateur signals that appear all too frequently on our "exclusive" amateur bands.

There are a number of them, mostly Soviet in origin. They've been there for years and they seem to pay no attention to international radio regulations.

Of course, the Soviets are members of ITU (the International Telecommunications Union) and ITU has their signed acceptance of various frequency assignments—for broadcasting, maritime mobile, aviation and many other uses including amateur. Unfortunately, these frequency assignments seem to have escaped the notice of many Soviet officials. As a result, many Soviet stations operate on frequencies not assigned to their service.

What to do? There is an official channel of communication through ITU. Within the ITU there is an office called IFRB (International Frequency Registration Board). The IFRB is charged with registering complaints about interference. Of course the IFRB can't go out and cut coax or blow up transmitters, but they can take complaints and forward them to an offending country.

There is one small problem with the procedure. The complaint must come from the

"administration" of an ITU member. In Canada, that means DOC. For IFRB, DOC is the only official input for Canadian amateurs regarding non-amateur QRM. If you are an amateur suffering QRM from non-amateur stations (and be very sure it is a non-amateur station), you must work with DOC.

CRRL, as member of IARU, has set up an Official Monitoring System. Coordinator is Malcom Harmon, VE3KXH, R R 2, Newcastle, ON L0A 1H0. Malcom is available to forward your complaints of non-amateur QRM in the amateur bands to DOC for processing. Whether DOC will subsequently forward complaints to IFRB is still unknown, but if enough amateurs complain about a particular interference, DOC is bound to act.

Complaints should be written up in a standard way. Frequency should be accurate to within 1 kHz. If it is an FSK signal, the frequency shift should be noted (Soviet stations generally use shifts of 250, 500 and 1000 Hz). Also note the time and date of the interference in UTC, and give the approximate signal strength. If you are familiar with the SINPO method of signal reporting, use it. It is much better than RST. Then listen some more. If you hear the interference on at least three days, contact Malcom with your information.

A word of caution: don't use Malcom to

report off-frequency operation or malicious interference by amateurs. Malcom is for non-amateur interference only. And now, here are some frequencies to check:

7008 kHz most any time of day. Signal originates from Murmansk or Petropavlovsk. Frequency-shifted high-speed Russian CW.

7048 kHz daily at 1300–1700 UTC. Russian teletype with 1000-Hz shift.

14024 kHz daily at 1000–1800 UTC or when the band is open to Moscow where the station is located. 250-Hz shift teletype.

14075 kHz plus or minus a few kHz daily at 1400 UTC. Call letters: VRQ. Located in Viet Nam. Transmits poor quality CW for about an hour or until traffic is finished.

21032 kHz 2200–0400 UTC daily. Sends Russian CW and 250-Hz teletype from Petropavlovsk. Text is encrypted, but some clear short signals occasionally.

Try for these signals and also look for others. As you gain experience you will quickly be able to identify the non-amateur signals. Then offer to help Malcom and the CRRL Monitoring System. It's part of the worldwide IARU Monitoring System building evidence for WARC-92. Material gathered by you can be extremely helpful to the amateur cause. —Wlf "Gib" Gibson, W7JIE, Coordinator IARU Region 2 Monitoring System. ■

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50W (TM-231A), 35W (TM-431A) with a 3 position power switch (high, medium, low).
- **Optional full-function remote controller (RC-20)**

A full-function remote controller using the Kenwood bus line, model RC-20, may be easily connected to the TM-231A/431A/531A and can be mounted in any convenient location. Using the IF-20 interface the RC-20 may be connected to four mobile transceivers. (TM-231A/431A/531A or the TM-701A)

- **Multi-function DTMF hand supplied.**
Controls are provided on the microphone for CALL (Call Channel), VFO, MR (Memory Call or to change the memory channel) and a programmable function key. The programmable key can be used to control one of the following on the radio: MHz, T. ALT. TONE, REV, DRS, LOW or MONITOR.

- **Easy-to-operate illuminated keys**
A functionally designed control panel with backlit keys increases the convenience and ease of operation during night-time use.

- **Auto repeater offset on 154 and 220 MHz.**

- **Built-in digital VFO.**
a) Selection of the frequency step (5, 10, 15, 20, 12.5, 25kHz)
*TM-531A: 10, 20, 12.5, 25kHz

- b) **Programmable VFO**
The user friendly programmable VFO allows the operator to select and program variable tuning ranges in 1 MHz band increments.

- **Programmable call channel function.**
The call channel key allows instant recall of your most commonly used frequency data.

- **Selectable CTCSS tone built-in.**
- **Tone alert system – for true "quiet monitoring"**

When activated this function will cause a distinct beeper tone to be emitted from the transceiver for approximately 10 seconds to signal the presence of an incoming signal.

- **Easy-to-operate multi-mode scanning.**
Band scan, Program band scan, Memory scan plus programmable memory channel lock-out, with time operated or carrier operated stop.

- **Priority alert.**

- **DRS (Digital recording system)**
The optional DRU-1 can store received and transmitted messages for up to 32 seconds, allowing the operator to quickly check or return any call using the tone alert system.

- **Automatic lock tuning function (TM-531A).**

- **Repeater reverse switch.**



Optional Accessories

- **RC-20** Full-function remote controller
- **RC-10** Multi-function remote controller
- **IF-20** Interface unit handset • **DRU-1** Digital recording unit • **MC-44** Multi-function hand mic. • **MC-44DM** Multi-function hand mic. with auto-patch • **MC-48B** 16-key DTMF hand mic. • **MC-55** 8-pin mobile mic. • **MC-60A/80/85** Desk-top mics. • **MA-700**

- Dual band (2m/70cm) mobile antenna (mount not supplied) • **SP-41** Compact mobile speaker • **SP-50B** Mobile speaker • **PS-430** Power supply • **PS-50** Heavy-duty power supply • **MB-201** Mobile mount • **PG-2N** Power cable • **PG-3B** DC line noise filter • **PG-4H** Interface connecting cable • **PG-4J** Extension cable kit • **TSU-6** CTCSS unit

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THE CRRL BOOKSHELF

STUDY MATERIALS

	Non-Member	Member	Stock#	Postage	✓
Canadian Amateur Question Bank	10.00	9.00	112	.75	<input type="checkbox"/>
Canadian Amateur Code Tapes (OT)	38.00	34.25	200	2.50	<input type="checkbox"/>
Canadian Advanced Question Bank	10.00	9.00	116	.75	<input type="checkbox"/>
Banque de questions première	10.00	9.00	113	.75	<input type="checkbox"/>
Banque de questions supérieur	10.00	9.00	117	.75	<input type="checkbox"/>
First Steps in Radio, W1FB	8.00	7.25	470	.75	<input type="checkbox"/>
Premier pas en radio, W1FB	8.00	7.25	F900	.75	<input type="checkbox"/>
Operating an Amateur Radio Station	1.25	1.25	300	1.25	<input type="checkbox"/>
Help for New Hams	12.50	11.25	475	1.00	<input type="checkbox"/>

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Lapel Pins (OT)	3.00	3.00	130	.75	<input type="checkbox"/>
Large Cloth Diamond (5") (OT)	3.00	3.00	141	.75	<input type="checkbox"/>
Small Cloth Diamond (3") (OT)	2.00	2.00	151	.75	<input type="checkbox"/>
ARES Circular Patch (4") (OT)	4.00	4.00	161	.75	<input type="checkbox"/>
Set of 3 CRRL Logo Decals (OT)	1.00	1.00	180	.75	<input type="checkbox"/>

OTHER

Fifty Years of ARRL	5.75	5.25	460	.75	<input type="checkbox"/>
From Spark to Space	25.00	22.50	465	1.00	<input type="checkbox"/>
Gil (cartoon collection)	6.25	5.75	860	.75	<input type="checkbox"/>
Night Signals (adventure)	6.00	5.50	856	.75	<input type="checkbox"/>
Tompkins Adventures (6 books)	30.00	27.00	855	1.50	<input type="checkbox"/>
200 Metres and Down	10.00	9.00	560	.75	<input type="checkbox"/>

OPERATING AIDS

1990 North American Callbook (OT)	35.00	31.50	721	2.00	<input type="checkbox"/>
1990 International Callbook (OT)	37.50	33.75	711	2.00	<input type="checkbox"/>
Chicken Junction Directory (OT)	15.00	13.50	780	1.50	<input type="checkbox"/>
Log Book (OT)	3.50	3.00	121	.75	<input type="checkbox"/>
Super Log Book (OT)	5.75	5.00	125	.75	<input type="checkbox"/>
Radiogram Forms (pad) (OT)	2.00	1.75	170	.75	<input type="checkbox"/>
Grid Locator for North America (OT)	2.00	1.50	800	.75	<input type="checkbox"/>
DXCC Countries List (OT)	2.00	1.50	812	.75	<input type="checkbox"/>
ARRL World Map (OT)	14.00	12.50	840	2.50	<input type="checkbox"/>
Callbook Prefix Map of the World (OT)	8.50	7.75	RA10	*3.50	<input type="checkbox"/>
Callbook Prefix Map of N America (OT)	8.50	7.75	RA11	*3.50	<input type="checkbox"/>
Callbook Great Circle Map of World (OT)	8.50	7.75	RA12	*3.50	<input type="checkbox"/>
Callbook <i>folded</i> Map of the World (OT)	6.50	6.00	RA10F	1.00	<input type="checkbox"/>

***Callbook Maps—A Special Note:** Callbook maps (rolled versions only) ordered together can be shipped together. Add \$3.50 postage only once on orders of two and three Callbook maps.

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RSGB HF Antennas for All Locations	19.00	17.00	330	1.00	<input type="checkbox"/>
Antenna Compendium #1	12.50	11.75	420	1.00	<input type="checkbox"/>
Antenna Compendium #2	15.00	13.50	421	1.00	<input type="checkbox"/>
Antenna Notebook, W1FB	12.50	11.25	405	.75	<input type="checkbox"/>
Novice Antenna Notebook, W1FB	10.00	9.00	425	.75	<input type="checkbox"/>
Antenna Impedance Matching	19.00	17.00	450	1.00	<input type="checkbox"/>
Yagi Antenna Design	19.00	17.00	630	1.00	<input type="checkbox"/>
All About Cubical Quad Antennas	12.50	11.25	RP110	1.00	<input type="checkbox"/>
All About Vertical Antennas	13.75	12.50	RP120	1.00	<input type="checkbox"/>
Simple, Low-Cost Wire Antennas	15.00	13.50	RP140	1.00	<input type="checkbox"/>
Transmission Line Transformers	12.50	11.25	880	.75	<input type="checkbox"/>

OPERATING

Operating Manual	19.00	17.00	522	1.50	<input type="checkbox"/>
Complete DXer, 2nd edition	16.00	14.50	441	.75	<input type="checkbox"/>
Low Band DX	12.00	11.00	890	.75	<input type="checkbox"/>
Low Band DX Software (available for many computers; send SASE for prices)					

TECHNICAL

1990 ARRL Handbook	29.00	26.00	495	2.00	<input type="checkbox"/>
ARRL Electronics Data Book	15.00	13.50	516	.75	<input type="checkbox"/>
Radio Frequency Interference	5.75	5.25	532	.75	<input type="checkbox"/>
Solid State Design	15.00	13.50	551	1.00	<input type="checkbox"/>
Hints and Kinks, 12th edition	6.25	5.75	512	.75	<input type="checkbox"/>
QRP Notebook, W1FB	6.25	5.75	590	.75	<input type="checkbox"/>
Transmitter Hunting	21.25	19.00	390	1.00	<input type="checkbox"/>

VHF-UHF

All About VHF Amateur Radio	15.00	13.50	RP130	1.00	<input type="checkbox"/>
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Satellite Experimenter's Handbook	12.50	11.25	540	.75	<input type="checkbox"/>
Space Almanac	27.50	25.00	705	1.50	<input type="checkbox"/>

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Computer Network Conference #7	12.50	10.00	602	1.00	<input type="checkbox"/>
Computer Network Conference #8	15.00	13.50	603	1.00	<input type="checkbox"/>
Gateway to Packet Radio, 2nd edition	16.00	14.50	901	.75	<input type="checkbox"/>

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The CRRL Field Organization Forum

SECTION MANAGER ELECTION NOTICE

To all CRRL members in the Maritimes-Newfoundland Section: since no nominating petitions were received by the previously announced cutoff date, you are hereby resolicited for nominating petitions pursuant to an election for Section Manager. A petition, to be valid, must carry the signatures of five or more CRRL Full members residing in the Maritimes-Newfoundland Section. It is advisable to have more than five signatures. Photocopied signatures are not acceptable and signatures must be on the petition. Petition forms, FSD-129-C, are available from CRRL Headquarters in London, Ontario, but are not required. The following form is acceptable:

..... (place and date)

CRRL Field Services Manager

Box 7009, Station E

London, Ontario N5Y 4J9

We, the undersigned CRRL Full members residing in the Maritimes-Newfoundland Section, hereby nominate (name and call sign) as Section Manager for this Section for the next term of office: (signatures and call signs) (addresses with postal codes).

A Section Manager must be a resident of his or her Section and a licensed radio amateur holding a Canadian Advanced Amateur Certificate or equivalent, and have been a CRRL Full member for a continuous term of two years at time of nomination.

Petitions will be received at the CRRL Headquarters office until 1600 EDT 1990 June 08. If only one valid petition is received, the person nominated will be declared elected. If more than one valid petition is received, a balloted election will take place. Ballots will be mailed from CRRL Headquarters on 1990 June 29. Returns will be counted after 1990 August 20. A Section Manager elected as a result of these procedures will serve for a 18-month term of office beginning on 1990 October 01.

You are urged to take the initiative and file a nominating petition immediately. —*Jack Strangleman, VE3GV, Field Services Manager*

REPORTS FOR JANUARY 1990

Alberta: SM/STM/DEC: Bill Gillespie, VE6ABC; ASM: VE6AMM; SEC/TC: VE6AFO; OO: VE6TY. Section news very scarce. Alberta weather was good through most of January, but at the end of January and beginning of February, temperatures dropped to -30°C. Low-band conditions were not great, but did bring some amateurs back to their radios. Hopefully, more news for you next month.

Reports invited: CRRL Section Managers (SMs) and their Section-level assistants coordinate traffic handling, emergency communications and bulletin service across Canada. Your SM (name and address appears on page 2 of this *QST Canada*) welcomes reports of individual and club activities for publication in this column. Activities do not have to be related to the CRRL Field Organization or to CRRL.

British Columbia: SM: Ernie Savage, VE7FB. BCEN Manager Bill, VE7DDL, reports 889 check-ins and QTCs up. Please continue and report all messages handled, regardless what net. You worked for it, so get credit for it. BCPS Manager Jim, VE7JN, reports check-ins: high—231, low—91, total—5074. Herb, VE7ZK, is still in hospital following his stroke. Dogwood Breakfast Club met in Richmond. WX was snow, but 38 still enjoyed breakfast and eyeball QSOs. The SM awarded many BCEN members with Section Net Certificates. Top check-ins for 1989: Ken, VE7XA (365), Angela, VE7ANG (340), VE7FRZ (326), VE7FVG (324), VE7ESA (322), VE7BCF (310), down to VE7EQA (54), a total of 50, all on CW! Certainly shows good support for BCEN. Phone net also had an impressive number of check-ins, and we will see that they all get net certificates.

Manitoba: SM: Jack Adams, VE4JA; ASM: VE4IX; SEC: VE4TM; ATC: VE4ADP; NMs: VE4LB, VE4IX, VE4TE. Here it is 1990. Restructuring is "go" for September. This should prove interesting with many new operators on the phone portions of our HF bands. We with many years of phone operation will have to be patient with those who have worked only phone on the VHF bands or CW. What is proper phone operation? Mostly courtesy. Although technology has changed things over the last few years, many rigs still need tuning up, and many amateurs do use antenna tuners. It is annoying to be calling someone on a net frequency while someone else is tuning up. Memorize antenna tuner settings, tune up at low power and use a dummy load!

Maritimes-Newfoundland: SM: Carl Anderson, VE1UU; ASM: Ned Mulrooney, VO1MN; STM: Mel Lever, VE1VX; BM: Brent Taylor, VE1APG; EC (NB) Brian Upton, VE1ZJ. CRRL station VY2QST is in need of a home. If a CRRL member on PEI is interested in becoming trustee for VY2QST (CRRL will pay the licence fee), contact me via the Maritimes Phone Net or via packet, VE1UU @ VE1EI. QST station activities include disseminating CRRL bulletins, and participating in CRRL QSO parties. The call may be used for general operating as well. Moncton Area Amateur Radio Club (MAARC) executive for 1989-90 includes president—Oscar Doucette, VE1YI; vice president—Larry Brisee, VE1BUE; secretary—Allan Arsenault, VE1RED; and treasurer—Russ Nixon, VE1BJC. Oscar tells us that MAARC boosted its membership to over 100 to commemorate Moncton's 100th birthday this year. New Brunswick Amateur Radio Association (NBARA) meets every Wednesday at 2000 AST/ADT on 3765 kHz. Thanks to MAARC for their newsletter and meeting invitation. I will be at Truro ARC on February 12 MAARC on February 19. I hope to visit as many Maritimes-Newfoundland clubs as possible this spring. I just read *On Both Sides of the Law* by Hugh Corkum, VE1VN, who passed away late last year. Hugh was a wireless operator in the 1920s and 30s, and crewman on a series of St-Pierre-based rum-runners operating in the Maritimes and along the US east coast. Around 1940, he came ashore to serve as police chief of Lunenburg, Nova Scotia, for many years. The book is exciting, well-written, and well worth reading.

Ontario: SM: Larry Thivierge, VE3GT; BM: VE3GSA; SEC: VE3GV; STM: VE3CYR; TC: VE3EGO. 1989 statistics for our local and Section net operations reveal 25,014 minutes of operation with 2110 sessions held, 18,501 check-ins and 14,650 pieces of traffic. My sincere thanks to all who participated. A correction to the November column: VE3AC in Sudbury rather than VE3AVC is

busy working on satellite Mode L. On a recent trip to Mississauga I had an opportunity to have an eyeball with VE3DCX, and a two-metre QSO with VE3MNI. Jean advised that the CANWARN Net in Eastern Ontario celebrated its first anniversary of operation. The net meets every day on VE3RAA, a modern state-of-the-art repeater in Picton operating on 146.73 MHz (-). There are 16-17 check-ins daily. SORT has inaugurated a new two-metre repeater. VE3TCB operates on 146.94 MHz (-) in the Ipperwash-Grand Bend area. VE3ZZZ in Windsor has moved to 147.10 MHz (+). Special prefix CF3 has been authorized for use by all Canadian amateurs within the municipal boundaries of Sault Ste-Marie, Ontario, June 15-24, to mark the city being named the 1990 Forestry Capital of Canada. Listen for CF3SOO during Field Day. VE3BQN is active on packet. Congratulations to VE3BX for making ARRL's DXCC Honour Roll for the third time, with 309 countries on CW. Cam did it before on phone and mixed modes. VE3CSK is preparing a six-metre link for VE3MCR in Lucan. This will allow users to connect to six metres from two metres through this repeater. VE3BDR in Timmins is experimenting with version 1.06 of the popular MSYS BBS software. If he is successful, Timmins will finally have a full-blown BBS with ports on VHF and HF—a welcome addition to the provincial packet network. Regretfully, I report that VE3EPG and VE3FWI have become Silent Keys. Doug at Carleton University, VE3OCU, reports a Canadian first: packet at 56,000 bits per second. You can assemble a station with similar capability for about \$600. Interested? Contact Doug, VE3OCU @ VE3JF.

Quebec: SM: Harold Moreau, VE2BP; STM: VE2EDO; SEC: VE2LYC; BM: VE2ALE. New address of the CRRL Outgoing QSL Bureau is Box 56, Arva, ON N0M 1C0, and new bureau manager is John Henderson, VE3HFT. Bob Benson, Q.C., VE2VW, will soon retire as CRRL General Counsel. We thank him for all his service during the past sixteen years, and wish him a happy retirement. Avec regret, je dois vous annoncer le décès de Raynald, VE2DGG. Le hamfest de Sorel aura lieu le 27 mai. Plus de détails vous seront données plus tard.

Saskatchewan: SM: Bruce Rattray, VE5RC; ASM: VE5GHC; STM: VE5ELJ; SEC: VE5FY. The above met for a general discussion on February 4. As a result of this meeting, Saskatchewan CRRL officials will be meeting when necessary on the air, every Sunday night, just after the regular ARES net on 3780 kHz at 1550 UTC. Public Service events have started for the New Year with the annual Klondike Derby in Regina. Forty teams of scouts, guides, etc (243 in all) entered from around the province, as well as three teams from Minot, North Dakota. The event ran from 9 a.m. to 4 p.m. on Wascana Lake, with everyone enjoying hot refreshments and awards at the finish. Jim, VE5CS, organized communications. Amateur participants included VE5s AAA, AFQ, BCU, EE, ELJ, EP, GHC, IQ, JML, RJR and UU. Many amateurs have been wondering about the status of SARL. It's being looked into and I hope to have news next month. Moose Jaw-area amateurs, at the invitation of the Western development Museums, have set up a display of WW2-vintage transmitters and receivers. Check it out! Thanks to Fred, VE5IL, and Doug, VE5QN, for their work on this. Saskatoon ARC had an excellent demonstration of packet radio. Murray, VE5ACI and other Yorkton-Melville amateurs will be busy helping in the Saskatchewan Winter Games on February 18-24. Prince Albert-area amateurs have a new repeater at Dana: VE5BNA, 147.21 MHz (+). 73! ■

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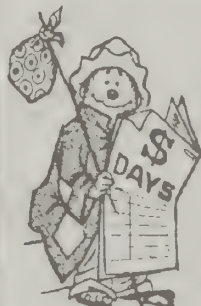
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Three Nifty Ideas

POWER STRUGGLE

Do you find yourself engaged in a power struggle every time you try to plug something into one of those newfangled power bars that have a whole lot of power outlets all in a row?

Chances are that you have a few of those little 6-, 9- or 12-volt dc power supplies, better known as "ac adapters", plugged into your power bar, and each one spreads out over more than one outlet. This will be the case if the outlets in your power bar are configured as in Fig 1.

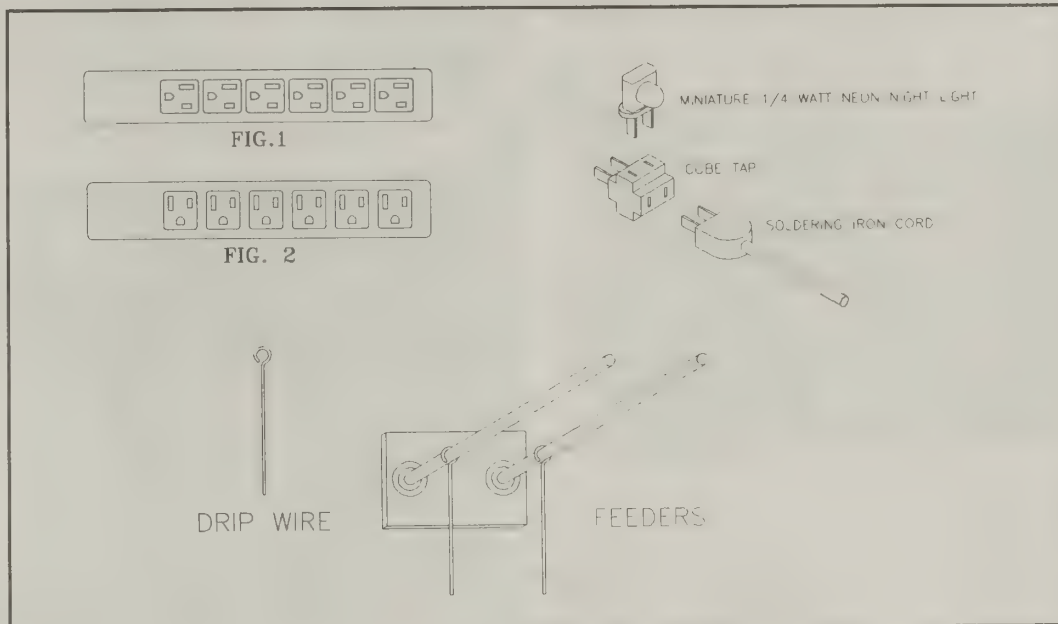
Unfortunately, most power bars are set up this way, but if you shop carefully, you can find power bars with outlets configured as in Fig 2. This configuration will line up the ac adapters so the output wires come off the side of the power bar instead of being scrunched up against whatever is plugged into the next outlet. Canadian Tire Corp usually stocks at least one bar in the preferred configuration, such as catalogue number 52-7215-4.

IDIOT LIGHT

I am one of those idiots who is forever plugging in things that don't have switches on them—things like soldering irons—and forgetting to unplug them when I have finished using them. Over the years, this uncouth behavior has cost untold burned-out devices, blown fuses and sky-high electrical bills.

To cure myself of this filthy habit, I have resorted to the simple "idiot light" shown in the diagram above—an idea which I first saw in the 1945 edition of ARRL's *Hints and Kinks for the Radio Amateur*.

The trick is to insert a night light and



plug into a cube tap—and then glue them there! This will discourage you from using the tap or the light for other purposes. If you want to get real fancy, insert a second neon light into the other side of the cube tap. This will make an impressive-looking plug, and will also ensure that you see one of the lights when your soldering iron or whatever is plugged into your wiring jungle.

DRIP WIRES FOR ANTENNA FEEDERS

The following idea is just as timely today as when it first appeared in the 1945 edition of ARRL's *Hints and Kinks*.

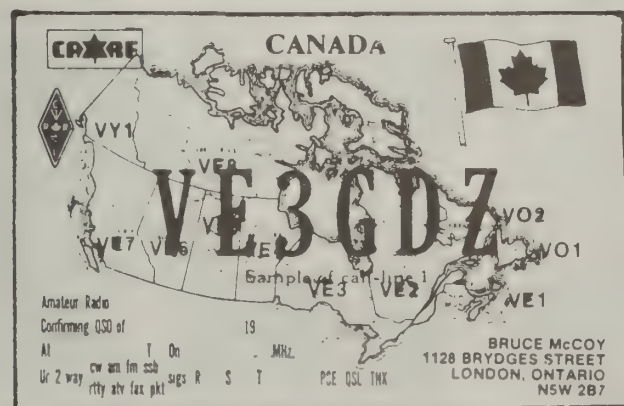
"When [open-wire] antenna feeders approach a window at a fairly low angle, rain has a tendency to follow the wires to the feed-through insulators before drip-

ping off. Unless the joints are waterproofed, rain may even penetrate a feed-through. In winter, the result is a pile of ice on the window sill and around the insulators.

"To remedy this, I made drip wires as shown in the diagram. They consist of short pieces of solid copper wire pinched onto the feeders a short distance from the window. (Modern note: solder these to the feedline; a poor electrical connection may result in harmonics by rectification and TVI.) These drip wires drain off all the water that runs along the feeders, eliminating the nuisance of water on the window sill as well as ice formation in winter. —Robert E Foltz, W9GBT"

Incidentally, drip wires work for coaxial cable as well as for open-wire feeders. Try this idea. It works. ■

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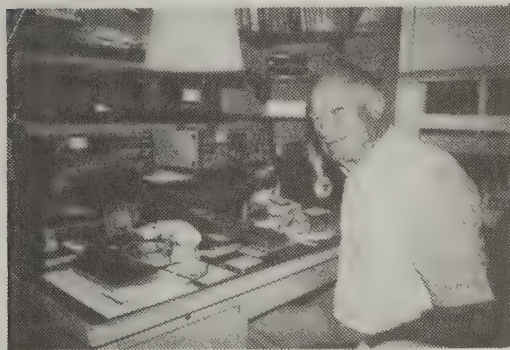
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Bermuda Friends

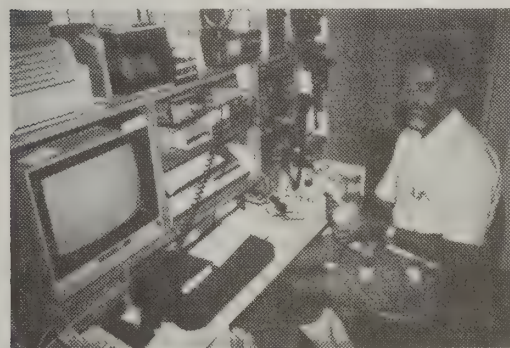
Last month we published the rules for the 1990 Bermuda Contest. We hope you took part in the contest and made some new friends, as we did in the 1989 Bermuda Contest, and on our follow-up trip to Bermuda to pick up our trophy.

VP9HL: An FB Host



John Young, VP9HL, and his XYL Elsie traditionally host a cocktail party for contest winners and the Radio Society of Bermuda's executive at their lovely Riddell's Bay home. John is a retired pharmacist and owner of the Pheonix Drug Store.

VP9HK



Tony Siesse, an optometrist, sees things clearly as the Radio Society of Bermuda's IARU representative. Tony's station features a TS-430, TS-130, SB-610 and Yaesu two-metre packet capability.

Winning YLs



Betsy Baille, VP9NMJ, received an ARRL membership and subscription to *QST* for being the newest amateur at the 1989 Radio Society of Bermuda banquet.

Rose Spershott, VP9LP, holds her plaque for being the top YL in the 1989 Bermuda Contest.

VP9 Portable QSL Bureau



Laurie Wadson, SWL046, soon to be novice VP9N?, assists Suzanne Platau, VP9LV, in distributing QSLs at the Radio Society of Bermuda's monthly meeting. LV's phonetics are appropriate: she is a "Little Violin" teacher.

DK8FD Bermuda DXpedition Kit



Alex, VP9/DK8FD, is ready to go with a Visitor's Temporary Operating Permit in one hand, a G5RV antenna in the shopping bag, and an FT-757, power supply

and antenna tuner in the suitcase. Neat!

VP9ID



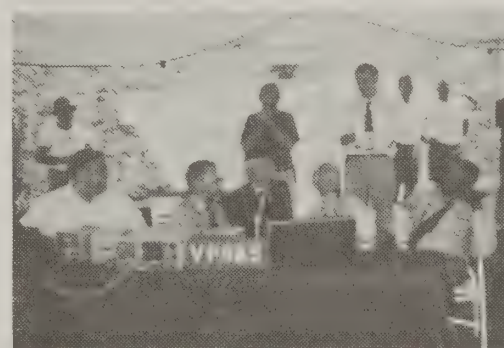
Glen Cuoco, VP9ID, with his TS-430, and LK-500Z Amp Supply linear is "Intermittently Detectable". Glen is past president of the Radio Society of Bermuda and its contest chairman; OM to Barbara, VP9JG; witty, entertaining, and helpful. Ask Glen about his new S-meter.

VP9AD and VP9IJ



Judy, VP9IJ, and Allan, VP9AD, Davidson's FB QTH is often used for multi-operator, multi-transmitter contest efforts. In the 1989 CQ WW, they made over 16,000 QSOs. Note the framed map Worked All Bermuda Award, and the 5BWAS and 5BDXCC plaques. Their station includes a TS-930S and a 204BA.

Bermuda Scouts JOTA



Bermuda Governor Sir Desmond Langley, with microphone in hand, and Lady Langley to his right, talk to North American scouts and cubs from VP9BS during JOTA. We even got into this picture! ■

United Airlines Flight 232 Disaster

Last July, a commercial DC-10 airliner crashed while attempting an emergency landing at the Sioux City, Iowa, airport. Of the 296 persons aboard, 111 perished. We are grateful to Worldradio magazine for information on the disaster and on the experience gained.

Less than an hour after the crash, the Sioux City ARES group was alerted and asked to assist with communications. They immediately activated their emergency net on the 146.91-MHz repeater. Check-ins were taken and operators were dispatched to the Emergency Operations Centre, the airport control tower, the two hospital emergency rooms, "Red Cross Headquarters, and a special Red Cross reception centre set up at a local college.

Later, amateurs were also dispatched to the flight line and command post at the disaster site, and the temporary morgue on the grounds of the Iowa Air Guard. From one to five amateurs were active at each of these locations for the next five days. Twenty-four-hour operation was necessary for the first two days, and additional amateurs volunteered their services. Many stayed on-site for thirty hours or more, providing communications. Each amateur brought personal equipment, handhelds and base stations. Commercial power was available for charging batteries for the handhelds, and for operating the base stations.

Amateurs spent much of their time providing assistance and communications for the American Red Cross. Communications were established between Red Cross food preparation locations, the Red Cross chapter house, and housing for survivors and their families at the college. Amateurs also assisted by providing food and beverages, water and ice, to members of the National Guard, FBI, and other personnel working at the crash site.

One special communications request was made and met. Two operators were needed to provide communications between the temporary morgue and the State Medical Examiner working at the crash site and identifying victims. This was set up on simplex in a very short time.

The all-out effort by the ARES operators was acknowledged and appreciated by all of those involved in the response to the crash of Flight 232. Some 64 amateurs contributed over 1150 hours of assistance throughout their ordeal. In the process, they gained valuable experience that can be of use to amateurs involved in future disaster communications. Here are some of the things they learned:

1. Knowing whom to place at specific locations can help smooth information flow. Place a trained communicator at each location. Use less experienced personnel to assist the trained communicator.

2. Have a single net control. He or she can decide how to run the net. In this case, a relatively loose control style worked well. In a life or death situation, it

might be better to run a tight ship. The decision on what control style to use should be made early.

3. Someone has to become the major decision maker. During this incident, two persons held this role. Since they had worked together prior to the disaster, the arrangement worked well. Whatever, one can't be wishy-washy. Decisions have to

Field Organization Reports January 1990

CRRL Section Emergency Coordinator Reports

Reports were received from the following SECs (DECs and ECs reporting to SECs are listed in brackets) denoting a total ARES membership of 922.

Reporting	ARES Members
VE3GV (VE3s DAN, EFX, FOB, GNV, ITL, ITT, JJA, KBU, KXB, LFV, LKI, LPM, LYW, MB, SV, TNL)	578
VE4TM (VE4VR)	34
VE6AFO (VE6s AMM, AKY, XD)	254
VE7FB	56

CRRL Section Traffic Manager Reports

Call	Orig	Rcvd	Sent	Divd	Total
VE1BKM	0	12	12	0	24
VE1ALU	1	7	8	0	16
VE1ADJ	0	6	8	1	15
VE1DLC	0	6	6	2	14
VE1CRS	0	5	2	2	9
VE1IH	1	2	3	0	6
VE2BP	3	17	11	17	48
VE2WH	2	14	15	14	45
VE2ALE	0	8	5	0	13
VE3ORN	5	79	70	16	170
VE3CYR	1	91	41	2	135
VE3DPI	0	52	55	8	115
VE3GNW	0	40	53	0	93
VE3BDM	1	56	25	1	83
VE3GT	0	19	47	0	66
VE3DVE	0	23	32	2	57
VE3IN	1	37	7	4	49
VE3KCZ	4	12	10	5	31
VE3EUI	0	9	13	0	22
VE3SB	0	10	8	3	21
VE3LPM	1	6	8	5	20
VE3AJN	0	6	11	0	17
VE3FGU	1	4	11	0	16
VE3MNI	0	3	6	0	9
VE3NVJ	0	4	4	0	8
VE3WV	0	1	4	0	5
VE3WM	0	1	3	0	4
VE3BAJ	0	0	3	0	4
VE4JA	40	75	100	32	247
VE4JR	0	30	26	0	56
VE4STU	4	20	16	0	40
VE4TE	0	15	15	0	30
VE6CPP	-	-	-	-	15
VE6GUS	-	-	-	-	14
VE6ABC	-	-	-	-	8
VE6AKY	-	-	-	-	2
VE7BNI	15	65	62	48	190
VE7ANG	2	103	77	1	183
VE7EJU	2	65	92	0	159
VE7DDL	1	62	27	1	91
VE7FAZ	1	39	36	1	77
VE7CCJ	22	21	26	0	69
VE7XA	1	29	15	5	50
VE7FB	1	24	14	4	43
VE7FRZ	0	17	20	1	38
VE7OA	10	10	10	1	31
VE7AVA	5	7	6	1	19

Call	Orig	Rcvd	Sent	Divd	Total
VE7BCL	2	11	2	3	18
VE7BCF	6	4	6	0	16
VE7ESA	0	0	6	0	6

National Traffic System

Net (Mgr)	Sess	QNI	QTC
APN (VE1BKM)	26	110	77
KTN (VE3AJN)	13	96	12
OLN (VE3POJ)	31	491	41
OPN (VE3IN)	31	667	199
OQN-1 (VE3GSQ)	23	39	16
OQN-D (VE3ORN)	31	150	78
OQN-E (VE3CYR)	29	117	74
OQN-L (VE3GSQ)	17	36	14
MTN (VE4IX)	29	256	52
MEPN (VE4LB)	31	1323	21
MWX (VE4TE)	31	467	26
APSN (VE6AKY)	31	1547	13
ATN (VE6CCP)	31	284	86
BCEN (VE7DDL)	31	889	256

Brass Pounders' League

This listing is available to amateurs who report to their SM a traffic total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies, using standard ARRL-CRRL form, within 48 hours of receipt.

BPL: None this month

Public Service Honour Roll

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max 30; (2) Checking into phone/RTTY nets, 1 point each, max 30; (3) NCS CW nets, 3 points each, max 12; (4) NCS phone/RTTY nets, 3 points each, max 12; (5) Performing assigned NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as an EC or NM for an entire month, 5 points max; (9) Participating in a public-service event, 5 points each, no max. Amateurs who qualify for Public Service Honour Roll 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special certificate from CRRL Headquarters.

PSHR: VE4JA (138), VE4JR (64), VE4STU (83), VE7ANG (70)

Service and Specialized Nets

Independent Net Managers: Your monthly reports are welcomed. Send to CRRL, Box 7009, Station E, London, ON N5Y 4J9.

Net (Mgr)	Sess	QNI	QTC
ARES Canada (VE3GV)	4	163	3
ARES Ontario (VE3GV)	1	6	0
CRRL ONTARS (VE3FQV)	31	12159	0
Grey-Bruce (VE3BDM)	31	73	11
Grey-Bruce SS (VE3BDM)	31	73	11
Laurentian (VE3FGT)	31	-	-
Transprovincial (VE3EUI)	31	8023	2
ARES Alberta (VE3AMM)	2	118	0

be made—fast. People who have disaster training are probably the people who should be in control at this time. Emergency Coordinators (ECs) are often the best ones to make decisions, as they tend to have the best training from ARES, Red Cross and other emergency agencies.

4. Use portable repeaters. They extend range of handhelds operating on low power. Using low power on the handhelds can extend battery life dramatically.

5. Log all repeater communications using a VOX-controlled tape recorder. Ideally, this recorder should be located at the net control station to record *all* transmissions. Net control can record additional events that occur by dictating into the recorder. In this case, a combination of handwritten logs and about six hours of tape recording was used.

6. In this type of disaster, the work is just beginning after the first two days. Once the survivors have left for their homes, the relatives of the deceased will arrive. They will need to be housed, fed, and comforted. This is probably one of the most difficult areas to deal with emotionally. Volunteers and communications will be required at the morgue. Some amateurs can work in situation like this, but others cannot. A personal knowledge of your volunteers is necessary if you want to place them properly.

7. Develop a good working relationship with the local emergency response authorities beforehand. In this disaster, the amateurs were particularly effective because they knew the names and faces of the key players in the various agencies.

8. No operator can be prepared for the emotional impact of what he or she will experience. Many of the operators were required to be in and around the crash site and the morgue, and to be with the families of the deceased. Counselling is usually available during and after this kind of disaster. Use it. Encourage every amateur involved to attend at least one counselling session. The importance of this cannot be overstated.

9. Both base and portable packet stations should be available. Even though this situation did not require extensive use of packet radio, most disaster communications can benefit from having it on hand. Amateurs are usually the only ones who can provide this type of communications.

10. Visual identification of operators is helpful. Jackets with ARES patches, arm bands and large signs on walls can be used. Advertise where communications centres are located so people can find them quickly.

11. Have monthly meetings to review preparedness. A different topic each month will keep meetings interesting. One meeting could be for planning, another for making kits of supplies that could be taken to a disaster site, another

A Unique Opportunity

By Sylvan Katz, VE5ZX
203 Ball Cr
Saskatoon, SK S7K 6E1

This is a personal invitation to all national, provincial and local amateur radio associations and clubs to join together. I believe that our country needs your help. Before I get to my idea, let me give you some background information.

A national effort has been mounted to promote a better understanding of science and technology in our society, especially among our young people. The Ministry of State for Science and Technology (MOSST) has just announced a program designed to promote a science-oriented culture in Canada. Science Culture Canada's central objectives are:

1. to increase public awareness of scientific and technological achievements and potential, particularly those of Canadian origin and application;

2. to stimulate greater public interest in, and understanding of, the role and impact of science and technology in contemporary society;

3. to improve communications between scientists and non-scientists, between creators and users of technology and between those who generate technological change and those who are affected by it; and

4. to develop and sustain greater interest in, and awareness of, science and technology among Canada's young people.

To support this national effort, Science Culture Canada has an annual budget of approximately \$2.5 million which is divided among project funding, general core funding, and youth core funding. Non-profit organizations, associations or societies, amongst others, are eligible for to apply for project funding. The youth core funding is of particular interest to me. Those formally constituted Canadian organizations whose primary mandate is to develop and sus-

tain greater interest in, and awareness of, science and technology among our young Canadians are eligible for youth core funding. There are a number of criteria which must be met which include hands-on participation by Canadian youth and volunteer participation.

Does the Canadian Amateur Radio community have something to offer? Can we give our youth a hands-on illustration of science and technology in operation? Yes! We can show our youth how we use basic science and modern technology to talk to other hams around the world, network computers via radio communications, launch and use our own satellites, bounce radio signals off the moon, aurora and meteors, provide emergency communications, etc. As each of us knows, the story is amazing and the examples are endless!

I believe that a national effort can be organized to show our youth, through hands-on demonstrations, the importance of information and communications technology in their life and the contributions that Canadians have made and are making in this area. An undertaking of this nature would require national cooperation and coordination. With some help from our equipment suppliers, contributions from some Canadian corporations and support from Science Culture of Canada youth core funding, we might be able to put together a road show that travels across Canada and visits schools. Local clubs, organizations and individuals would be called upon to coordinate and manage the activities in their regions.

I believe this activity would not only be good for Canada, it would be good for Canadian Amateur Radio, good for our youth and great fun! What do you think? Contact us at the address above and let us know. ■

could be for making power cables for the base stations, and so forth.

12. After any disaster, review the entire operation with those who participated and solicit their feedback. Encourage everyone to tell what went right and what went wrong. Ask for input in improving the communications plan. Many of those you ask may decide to become more involved in emergency planning and emergency communications.

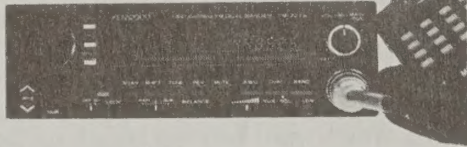
—Bob Boyd, VE3SV

ARES is a branch of the CRRL Field Organization. It is hoped that this column, which also appears in The Canadian Amateur, will serve as an ongoing source of news and information about ARES activities across Canada. ARES members, particularly ECs, are invited to send information on what they are doing and developments they would like to share. We will pull this together for future columns with the objective of increasing our ability to serve, should disaster strike. ■

KENWOOD



TS-940, TS-680S, TS-440, TS-140



TM-721A, TM-231A
TR-751A

TH-205AT, TH-215A
TH-415A, TH-75A



TH-25AT, TH-45AT

LEASE TO OWN

1. TRYLON 48' TOWER, 12-FOOT MAST AND MAST BEARING, HYGAIN HAM IV ROTOR PLUS 100' 8-WIRE CABLE, HYGAIN TH3JR 10, 15, 20-METRE ANTENNA, BN-86 BALUN, FOUR PL259 CONNECTORS AND 100' RG 213u ANTENNA WIRE...

(A) WITH KENWOOD TS-140S TRANSCEIVER AND PS-430 POWER SUPPLY

TOTAL PRICE—\$3900, CASH PRICE—\$3650

36-MONTH LEASE—\$142.58 PER MONTH

42-MONTH LEASE—\$127.76 PER MONTH

(B) WITH ICOM IC-735 AND PS-55 POWER SUPPLY

TOTAL PRICE—\$4200, CASH PRICE—\$3950

36-MONTH LEASE—\$153.55 PER MONTH

42-MONTH LEASE—\$137.54 PER MONTH

2. TRYLON 48' TOWER, 12' MAST AND MAST BEARING, HYGAIN HAM IV ROTOR PLUS 100' 8-WIRE CABLE, HYGAIN EXPLORER-14 10, 15, 20-METRE ANTENNA, BN-86 BALUN, SIX PL259 CONNECTORS, 200' RG 213u ANTENNA WIRE...

(A) WITH ICOM IC-761 TRANSCEIVER AND ICOM IC-275H ALL-MODE

TOTAL PRICE—\$8778, CASH PRICE—\$8550

36-MONTH LEASE—\$311.71 PER MONTH

42-MONTH LEASE—\$278.00 PER MONTH

(B) WITH ICOM IC-751A, PS-30 POWER SUPPLY AND ICOM IC-275H

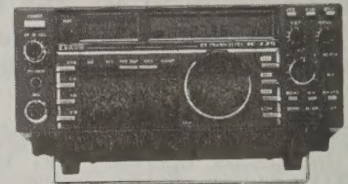
TOTAL PRICE—\$7784, CASH PRICE—\$7500

36-MONTH LEASE—\$277.27 PER MONTH

42-MONTH LEASE—\$243.56 PER MONTH

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IC2GAT, 32AT, 4GAT, 2SAT



IC-228H, 448A, 900

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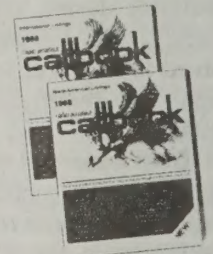
ACCESSORIES

- Power Supplies
- Accessories
- Bencher Paddles
- Meters



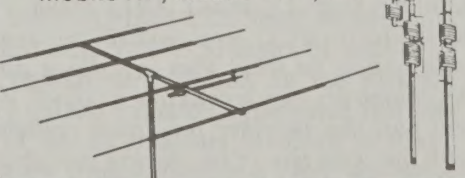
PUBLICATIONS

- ARRL
- Radio Amateur Callbook
- World Radio TV Handbook
- Gordon West Radio School



ANTENNAS

- Cushcraft AP8, A3, ARX-2B, 215 WB + more
- **hy-gain**
- Hustler Mobile HF, Mobile VHF, etc.



ACCESSORIES



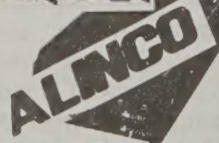
MFR

Antenna Tuner
Plus Full Line
Of Accessories

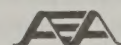
AMERITRON

MIRAGE

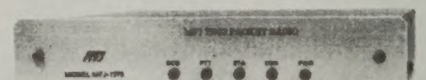
VHF & UHF Amps



PACKET Kantronics



PK-232, PK-87



1278

MFR

1270B, 1274, 1278

Consider the Benefits... ...Join CRRL Today!

Pensez aux avantages... ...Devenez membre dès aujourd'hui!

Consider the benefits of joining CRRL: **QST Canada** and **QST** (either or both) monthly journals, **free CRRL Outgoing QSL Bureau**, and **discounts** on CRRL, ARRL and RSGB books and materials. Your membership supports many important services to Canadian Amateur Radio: **representation to DOC** and other government agencies, **representation to IARU**; Field Organization (NTS, ARES, OBS) for public service, the incoming QSL bureaus and much much more. Consider the **benefits** for you and Canadian Amateur Radio and **join CRRL today!**

Pensez aux avantages d'être membre de la Ligue Canadienne de la Radio Amateur (CRRL) : abonnement aux publications mensuelles **QST Canada** et/ou **QST**, **service gratuit de QSL vers l'étranger et réductions** sur les livres et produits de CRRL, ARRL et RSGB. Grâce à votre cotisation, nous pourrions continuer à servir les radioamateurs canadiens **en les représentant auprès du ministère des Communications** et d'autres organismes gouvernementaux, ainsi que sur la **scène internationale**, et en mettant sur pied des réseaux servant l'intérêt commun, pour ne nommer que ceux-là. **Devenez membre de la Ligue.** La radio amateur canadienne et vous en sortirez **gagnants!**

Count me in! Here's my application for a one-year CRRL membership! I choose... / Comptez sur moi! Voici ma demande d'adhésion. Je veux devenir membre pendant un an et recevoir...

QST Canada: ☐ regular rate \$27 a year / tarif régulier 27 \$ par an ☐ seniors' rate \$24 a year / âge d'or 24 \$ par an*
QST Canada + QST: ☐ regular rate \$49 a year / tarif régulier 49 \$ par an ☐ seniors' rate \$46 a year / âge d'or 46 \$ par an*

QST: ☐ regular rate \$42 a year / tarif régulier 42 \$ par an ☐ seniors' rate \$39 a year / âge d'or 39 \$ par an*

*Proof of age is enclosed. / Preuve d'âge ci-jointe.

Name/Nom: _____ Call/Indicatif: _____

Address/Adresse: _____

PC/CP: _____

☐ Payment is enclosed. / Cotisation incluse. ☐ Please bill me later. / Veuillez me facturer.

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